



## **Amendment on Specification**

Amendment of specification. Please replace the amended contents bellow.

### **The Use of Wireless Devices' External Storage**

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### **Field of the Invention**

This invention is the continuation of the previous invention, application number 60/401,238 of "Concurrent Web Based Multi-task Support for Control Management System", where the claim 20 item a), b), d), claim 30 item b), and together with claim 36 represent an invention of using storage of a server system as the external storage for wireless devices. This invention focuses on how can a wireless device user actually use external storage. Specially it focus on how can a wireless device to download data to its external storage, which its principle has preliminary described in claim 19) of previous invention, application number 60/402,626 of "IP Based Distributed Virtual SAN", to transmit data in wireless environment.

### **A Method and Apparatus of Providing External Storage of Wireless Devices**

#### **Cross-References To Related Application(s)**

This application is the continuation-in-part of United States Patent Application Se. No.10/713,904, filed on August 5, 2002 in the name of the same inventor and entitled "Concurrent Web Based Multi-Task Support for Control Management System" and is also a continuation-in-part of United States Patent Application Se. No.10/713,905, filed on August 12, 2002 in the name of the same inventor and entitled "Method and Apparatus for web-based Storage On Demand".

#### **Field of Invention**

This invention relates to provide wireless user having a web-based working environment to use larger number of external storage.

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## Background Information

**a) Terminology:**

- **The Internal Storage of a System:**
  - The storage media such as hard disk drives, memory sticks, memory etc is connected to a system directly through bus or a few inches of cable. Therefore, the storage media actually is a component of a system in a same enclosure.
- **The External Storage of a System:**
  - The storage media is not a component of a system in a same enclosure. Therefore, they has to be connected through longer cable such as Ethernet cable for IP based storage, Fiber channel cable for fiber channel storage, or wireless media etc. The storage media of external storage could be magnetic hard disk drives, solid state disk, optical storage drives, memory card, etc. and could be in any form such as Raid, which usually consists a group of hard disk drives.
- **The Storage Partition, its Volumes, and the Corresponding File System:**
  - To effectively use the storage system, the storage usually needs to be partitioned into small volumes. After partition, each volumes can be used to establish file systems on it. To simplify the discussion, the term of the storage volume, its corresponding file system, and the term of the partition of a storage are used without differentiation in this invention.
- **CCDSVM:**
  - It is an abbreviation for central controlled distributed scalable virtual machine system. The CCDSVM allows a control management station to control group of systems and provide distributed services to client system in Internet, Intranet, and LAN environment.

- **ISP & ASP:**
- **Internet service provider and application service provider.**

**b) Figures:**

~~Fig. 1: This is the same figure as Fig. 1 of “Concurrent Web Based Multi-task Support for Control Management System” with exception of renaming console host as wireless device.~~

~~Fig. 2: This is the same figure as Fig. 1 except that it shows the more details of storage system controlled by the server. In addition, multiple wireless devices are presented.~~

~~Fig. 3: This figure shows the scheme of wireless device download contents from ISP/ASP or other web sites to the external storage of this wireless device.~~

~~Fig. 4: This is the same figure as Fig. 1 of “IP Based Distributed Virtual SAN” with exception that each IP storage server provide file system as external storage for wireless devices instead of provide IP based virtual SAN service. Also, each host actually is a wireless device.~~

**c) Assumptions:**

~~Unless specified, the programming language, the protocols used by each software modules, and the system used described in this invention are assumed to be the same as described in previous patents submission.~~

~~In the drawing, like elements are designated by like reference numbers. Further, when a list of identical elements is present, only one element will be given the reference number.~~

## Brief Description of the Invention

Today [[the]] wireless users commonly face the problem of lack of storage capacity on their wireless devices such as cell phone or PDA, which usually limited to 256MB for PDA and much less for cell phone. To effectively solve this problem and let users own multiple GB of storage for their wireless devices as well as allow users to use [[GB]] gig-bytes storage for ~~their~~ multimedia application, the storage on a server can be used as the external storage for wireless devices. ~~This technology has been claimed in previous two patents submission by the same author.~~ Now we can examine how does ~~the external storage actually be used by the wireless device.~~ We can In one example that let each server unit (3 of Fig. 2) partitions its storage system in such way that each volumes will have multi-gig-bytes[[GB]] in size. Therefore, each user from web-browser of any of wireless devices can exclusively be assigned ~~and exclusively access for accessing~~ a specific storage volume on a server unit. In one embodiment, [[For]] for example, if we need to provide each user 4GB of storage space, then a 160GB disk drive can support 40 users. A 4096GB storage system on a server unit can support 1024 user.

Further, any data on the wireless device can be transmitted to assigned storage volumes on a server unit. In addition, in one embodiment, the user on the wireless device also can download the multimedia data from any ISP or ASP to the assigned storage volumes of a designated server unit through an out-band approach (Fig. 3). Finally, the user can use their web-browser, ~~which has functionality of invoking to invoke~~ embedded video or music, to enjoy their stored multimedia contents.

These and other features, aspects and advantages of the present invention will become understood with reference to the following description, appended claims, and accompanying figures where:

### Description of the Drawings

#### Brief Description of The Drawing

Fig. 1 has illustrated a wireless device (1) configured with a web-browser (8) and can access a server (3).

Fig. 2 has illustrated one or multiple wireless devices, each configured with web-browser, can access the assigned storage volumes of storage system on a server.

Fig. 3 has illustrated a scheme of present invention that how does a wireless device can download content file/data from ISP/ASP or other web sites to the assigned external storage of a wireless device.

Fig. 4 has illustrated a scheme of present invention that how to support unlimited wireless devices to have larger size of external storage.

In the drawing, like elements are designated by like reference numbers. Further, when a list of identical elements is present, only one element will be given the reference number.

#### Detailed Description Of The Invention

The following terms are used through out this patent application to describe the present invention. The internal storage media such as hard disk drives, memory sticks, memory etc is connected to a system directly through bus or a few inches of cable. Therefore, the internal storage media actually is a component of a system in a same enclosure. The external storage media is not a component of a system in a same enclosure. Therefore, they has to be connected through longer cable such as Ethernet cable for IP based storage, Fiber channel cable for fiber channel storage, or wireless media etc. The storage media of external storage could be magnetic hard disk drives, solid state disk, optical storage drives, memory card, etc. and could be in any form such as Raid, which usually consisting a group of hard disk drives.

To effectively use the storage system, the storage usually needs to be partitioned into small volumes. After partition, each volumes can be used to establish a file systems on top of it. To simplify the discussion, the term of the storage volume, its corresponding

file system, and the term of the partition of a storage may be used without differentiation in this invention.

Central controlled distributed scalable virtual machine system (“CCDSVM”) allows a control management station to control group of systems and provide distributed services to client system in Internet, Intranet, and LAN environment.

The ISP stands for Internet service provider and the ASP stands for application service provider.

Fig. 1 has demonstrates the network connection between a wireless device and a server, where

a) Net (2) [[represent]] represents a communication link, which may combined with wireless and non-wireless connection media and guarantee the communication packet can be sent/received between wireless device (1) and the server (3). It is also assume that the net (2) infrastructure is built up in such way that the user from web-browser of a wireless device can access and browse any web-site on the Internet, Intranet.

b) As described in previous patents submission, the [[console]] Console support software (5) on server (3) ~~can support web-based multi-task for~~ provides users on web-browser (8) of wireless device (1) with capability of running concurrent multi-tasks within a same single web-browser (8). Further, console support software (5) on server (3) provides [[the]] user on the web-browser (8) of wireless device (1) ~~is able~~ to perform creating ~~structured~~ layered files/directory or folders structure, and to perform data management operations such as delete, move, copy, rename for data files or folders/directories [[etc]] and so forth on the assigned storage volume of server (3).

c) As described in previous patents submission, the The other software modules (9) of wireless device (1) is also capable to send data to or receive data from other service modules (7) of server (3) via communication link (2) through suitable IP or non-IP based protocol. The data file being sent cold be a digital photo picture, a message [[etc..]] and so forth without limits.

As described in previous patents submission, the The console supporting software (5) of server (3) and the other software modules (9) of wireless device (1) can be

implemented with any suitable languages such as C, C++, Java, [[etc]] and so forth without limits.

~~As described in previous patents submission,~~ The web-browser (8) of wireless device (1) can be any suitable software, which is capable to communication with web server software (4) on server (3) ~~or with any other web server~~ through HTTP protocol or other web based protocols.

Fig. 2: ~~This figure has~~ demonstrated how does the storage of a server can be assigned to multiple wireless devices to use as their external storage.

a) ~~As described in previous patents submitting,~~ [[the]] The storage system (10) of server (3) can be partitioned into multiple volumes (11) by administration staff through web-console (13) of web console host (12).

b) The storage system (10) of server (3) can be partitioned in such way that each wireless devices can be assigned with a volume of desired size, which can be best supported by the server for maximum number of wireless devices.

c) ~~As described in previous patents submitting,~~ Also, the storage connection media could be any kinds such as SCSI cable, IP cable, Fiber cable etc. The storage system itself could be various types. ~~It assumes that~~ and the storage system can be accessed through IP or non-IP based network and protocols.

Fig. 3: ~~This figure has~~ demonstrated how a user from a web-browser (8) on wireless devices(1) can download data from a known web-site (12) to his/her assigned external storage (10) of server (3). The dash-lined path (a) represents a communication channel between wireless device (1) and any remote ~~download~~ web-site (12), ~~which provides from where the contents can be downloaded for web download.~~ The dash-lined path (b) ~~[[represent]] represents~~ a communication channel between wireless devices (1) and the storage server (3). The dash-lined path (c) represents a communication channel between wireless devices (1) and the remote web-server (12), ~~from where contents can be downloaded which provide download contents.~~

#### The Detailed Description of the Invention

### **1: The Use of the External Storage of the Wireless Device:**

~~The Fig. 2 shows a simplified diagram of the The wireless devices (1 of Fig. 2) [[using]] Using external storage system (10 of Fig. 2) of a server (3 of Fig. 2) by wireless devices (1 of Fig. 2) [,.] which will effectively [[resolve]] resolves the storage limitation problem of wireless devices (1 of Fig. 2).~~

#### **-Partition storage volumes (Fig. 2)**

~~With this invention, In one embodiment, the entire storage (10 of Fig. 2) on a server (3 of Fig. 2) need to be can be partitioned into suitable size of volumes (11 of Fig. 2) such as 4GB each, which will to allow the server to serve maximum number of wireless devices (1 of Fig. 2). With the web console support software (5 of Fig. 2) of the server (3 of Fig. 2), [[The]] the task of partitioning storage can be done through web-console (13 of Fig. 2) on console host (12 of Fig. 2) by administrative staff.~~

In order to support such storage partition, first the console support software (5 of Fig. 2) of the server (3 of Fig. 2) must send storage information of the server (3 of Fig. 2) to the web-console (13 of Fig. 2) of console host (12 of Fig. 2). This including, which includes the storage device name, storage total size etc. Second, the administration staff on console host (12 of Fig. 2) can use web-console (13 of Fig. 2) to fill and [[to]] send the storage partition information to the console support software (5 of Fig. 2) of the server (3 of Fig. 2). The, where the storage partition information includes the number of the partitions (volumes) and the size of each partition (volume). Third, upon receiving storage partition information from web-console (13 of Fig. 2) of console host (12 of Fig. 2), the console support software (5 of Fig. 2) of the server (3 of Fig. 2) performs the actual storage partition, which divides entire storage into multiple small volumes. Finally, for each small storage volume[,.] builds a corresponding file system could be built up.

#### **-Assign storage volumes (Fig. 2):**

Each storage volumes with its corresponding file system (11 of Fig. 2) of the storage (10 of Fig. 2) on server (3 of Fig. 2) needs to be exclusively assigned and

exported to a given specific wireless device (1 of Fig. 2) by the console support software (5 of Fig. 2) on server (3 of Fig. 2).

**-Data and storage volume management (Fig. 2)**

1) It is necessary to provide wireless user to manage data and storage volume on assigned external storage volumes. With the support of console support software modules (5 of Fig 2) of the server system (3 of Fig. 2), the user on web-browser (8 of Fig. 2) of wireless device (1 of Fig. 2) can setup the folder/directory structure on the file system of his/her assigned external storage volume (11 of Fig. 2). In addition, the user on web-browser (8 of Fig. 2) of wireless device (1 of Fig. 2) can perform all data management operations such as delete, copy, move, rename etc. on that file system.

In order to To support such data management on external storage (10 of Fig. 2) from web-browser (8 of Fig. 2) of the wireless device (1 of Fig. 2), first the console support software modules (5 of Fig. 2) of the server system (3 of Fig. 2) must communicate with send data information of said a server system to web-browser (8 of Fig. 2) of wireless device (1 of Fig. 2). Therefore, the user from web-browser (8 of Fig. 2) of wireless device (1 of Fig. 2) can choose desired data management operations and send operation information to console support software modules (5 of Fig. 2) of the server system (3 of Fig. 2)[[.]] These where, the operations include establishing folder/directory, copying, moving, or reaming data file [[etc]] and so forth. Second, upon receiving the data management operation, the console support software modules (5 of Fig.2) of the server system (3 of Fig. 2) actually performs these operations on the assigned file system of assigned external storage volume (11 of Fig. 2) on the server system (3 of Fig. 2).

**-Store data from wireless device into external storage (Fig. 2)**

To store the received data such as digital photo pictures, or messages and so forth into the assigned file system on external storage (10 of Fig. 2) of a server (3 of Fig. 2), the [[other]] software modules (9 of Fig. 2) of wireless device (1 of Fig. 2) need to send these received data to [[other]] service software modules (7 of Fig. 2) of server (3 of Fig.

2) via communication link ~~between them~~. Upon receiving data, the ~~ether~~ service software modules (7 of Fig. 2) of server (3 of Fig. 2) ~~of server (3 of fig. 2)~~ write [[these]] received data to assigned file system of the assigned storage volume (11 of Fig. 2) on server (3 of Fig. 2). The protocol used between these two communication entities could be either IP or non-IP based protocol.

#### **Download data from remote web server site into external storage (Fig. 3)**

If the wireless device (1 of Fig. 3) user want to download data from remote web server (12 of Fig. 3) directly into assigned file system (11 of Fig. 3) of the external storage (10 of Fig. 3) on server (3 of Fig. 3), the following steps are required:

- 1) ~~The user~~ User from web-browser (8 of Fig. 3) of a specific wireless device (1 of Fig. 3) accesses a remote download web server site (12 of Fig. 3) and [[obtain]] obtains the information for download via path (a) of Fig. 3. For example, to get information on a web-page of web server (12 of Fig. 3), which contains the data name for download.
- 2) The other software modules (9 of Fig. 3) of a specific wireless device (1 of Fig. 3) obtains download information, which becomes available in the cached web-pages on wireless device (1 of Fig. 3) after the web-browser (8 of Fig. 3) accessing the download site (12 of Fig. 3).
- 3) The other software modules (9 of Fig. 3) of a specific wireless device (1 of Fig. 3) send the obtained download information to [[other]] service software modules (7 of Fig. 3) of storage server (3 of Fig. 3) via path (b) of Fig. 3.
- 4) Upon receiving the download information from a specific wireless device (1), the [[other]] service software module (7 of Fig. 3) of the storage server (3 of Fig. 3) [[send]] sends a web download request to download web-site (12 of Fig. 3) via path (c) of Fig. 3 based on download information obtained[[. It then]] and further receives the download information data from web server of download web-site (12 of Fig. 3).
- 5) Upon receiving downloaded data, the [[other]] service software modules (7 of Fig. 3) of the storage server (3 of Fig. 3) write [[these]] received data for the specific wireless device (1 of Fig. 3) into the assigned external file system (11 of Fig. 3) on the server (3 of Fig. 3).

**Retrieve data from external storage of wireless device**

There several ways to retrieve data from external storage of wireless device to wireless device itself. In one embodiment, [[If]] a web-browser has embedded video or music functionality, the web-browser (8 of Fig. ) of a wireless device (1 of Fig. 2) can be used to retrieve and play [[those]] multimedia data file such as video or music stored in wireless device's external storage volume (10 of Fig.2), which actually located on a server (3 of Fig. 2). In another embodiment, If there is needs, the [[other]] software module (9 of Fig. 2) of wireless device (1 of Fig. 2) [[also]] can retrieve data file from assigned file system of the assigned storage volume (11 of Fig. 2) on server (3 of Fig. 2) via communication link.

**Support external storage for large number of wireless devices**

It is possible to provide mass number of wireless device users with external storage. For example, If we need to provide each user 2GB of storage space, then a 160GB disk drive can support 80 users. A 4096GB (4 Tera Bytes) storage system on a server unit can support 2024 user. Each server only can efficiently support a limited size of the storage system. In order to support a large number of wireless devices with external storage, for example supporting such as 500,000 of them wireless devices, a larger number of servers are required, in this case 250 servers is required. In order to let a larger number of the server to effectively support larger number of the wireless devices, an infrastructure like CCDSVM is desirable, which has been described in previous patents submission. With CCDSVM the control management station can control larger number of storage servers to provide external storage for [[huge]] unlimited number of the wireless devices.